

TRAINING IN REHABILITATION RESEARCH

John Whyte MD PhD

Moss Rehabilitation Research Institute

&

Thomas Jefferson University

W Zev Rymer MD PhD

Rehabilitation Institute of Chicago

&

Northwestern University



CONCEPTUAL BACKGROUND



- ◆ What is rehabilitation research?
- ◆ Why is conducting rehabilitation research particularly challenging?
- ◆ What are the implications for rehabilitation research training?

Rehabilitation Research

- ◆ Addresses diseases and conditions that are not currently curable or, if curable, leave residual disability
- ◆ Addresses in the short or medium term, the functional abilities and quality of life of the individuals affected
- ◆ Involves complex relationships among several levels of conceptual analysis

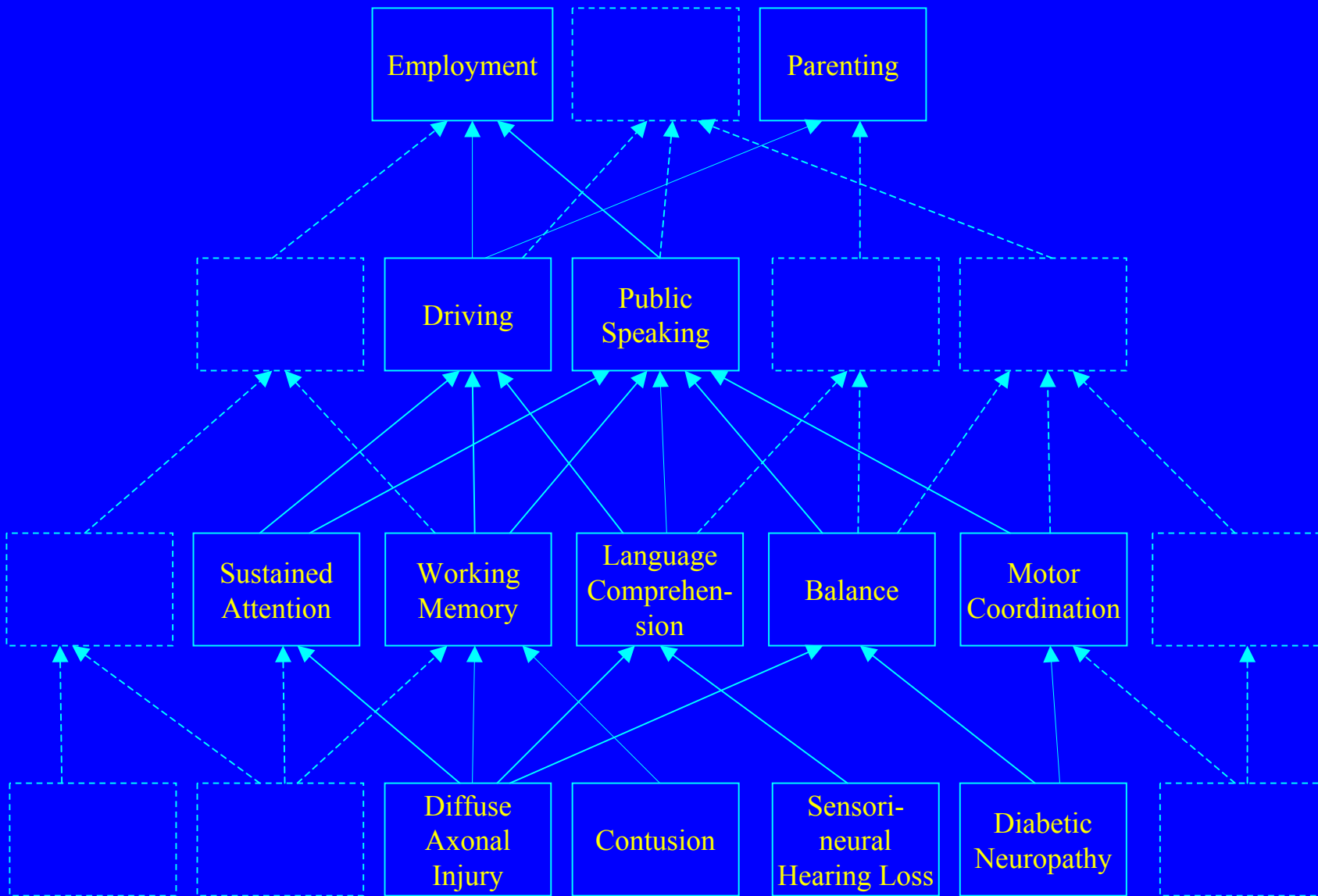
The Enablement/Disablement Process

- ◆ Pathology/disease
- ◆ Impairment
- ◆ Disability/functional limitation/activity
- ◆ Handicap/disability/participation

Biomedical Research

- ◆ Deals primarily with pathology and somewhat with impairment
- ◆ Assumes that function is directly related to resolution of pathology
- ◆ What about.....
 - Improvement in function w/o improvement in pathology?
 - Improvement in pathology w/o improvement in function?

Participation
Activity
Impairment
Pathology



Levels of Intervention

| | | LEVEL OF OUTCOME | | | |
|--------------------|---------------|------------------|------------|----------|---------------|
| | | Pathology | Impairment | Activity | Participation |
| LEVEL OF TREATMENT | Pathology | | | | |
| | Impairment | | | | |
| | Activity | | | | |
| | Participation | | | | |

Building Blocks

- ◆ Research subjects -- case mix issues: different case mix models for different outcomes
- ◆ Treatment: active ingredients, protocols, blinding
- ◆ Dependent variables: relevant validated outcome measures are lacking in many areas



Implications for Research



- ◆ Ideally, research should clarify the causal links among levels in the enablement/disablement process
- ◆ Most NIH-funded rehabilitation research to date stays primarily at one level

Implications for Training

- ◆ Investigators will often need to work in interdisciplinary teams
- ◆ Having in-depth knowledge regarding a level above or below the “target” level can be ideal
- ◆ Researchers need to build quantitative and testable models of these interrelationships
- ◆ Who mentors the linkages?

There are advantages in not being too original at the start

- ◆ You must realistically think about rapid productivity
- ◆ If you work on a close off-shoot of a mentor's research s/he will be able to help you anticipate and solve methodological problems
- ◆ If you work on a more distant problem, your mentor will be able to offer guidance but less direct experience

Write a Career Development Plan

- ◆ Who are you now and what skills do you possess?
- ◆ Who do you want to be and what skills will you need?
- ◆ What types of training experiences (courses, laboratory skill exposure, etc.) will get you there?
- ◆ Is your proposed mentorship plan the ideal path?
What additional mentorship do you need?

Negotiating a Faculty Position that Includes Clinical Research

- ◆ Having funding in hand provides leverage
- ◆ Need to make sure that you are in an environment that nurtures further research growth
- ◆ Long-term development is more important than short-term benefits: you can write your own ticket at your next job if you succeed!

What to look for in a Clinical Faculty Position

- ◆ Realistic amount of protected time (paid by your grant or as an investment by the department)
- ◆ Availability of relevant collaborators and technology
- ◆ Suitable patient population
- ◆ Continued mentorship and support for career development

Research Careers for Biomedical Scientists and Engineers

- ◆ If you are in a basic science or engineering department, and do rehabilitation research ---
A key issue is clinical relevance of your work and access to clinical materials
- ◆ If you are a Ph.D. in a clinical department ----
A key issue is whether you will be treated as an equal - a lot depends on how money flows



GRANTSMANSHIP



- ◆ Grant awards are a measure of your creativity and your competitive strength
 - ◆ They also fund your research
- But the former is perhaps more important, because it tells your employer you can probably compete in the future (because you already have been successful)

Grant Writing Skills

- ◆ Think about a progression of funding, e.g.:
 - Training grant (T32, F32, F31 or other awards)
 - Co-investigator on an R01 or other major grant
 - Pilot grant (R03, R21, R15)
 - Career development award (K01, K08, K23, K25)
 - Large grant as PI (R01- can be several 100K/annum)
 - PI of larger collaborative grant (P01, P50---

Mechanism/Theory

- ◆ The NIH is very mechanism-oriented - this focus is what got the NIH to be the premier research funding agency in the world
- ◆ Many of these mechanisms are quite fundamental - molecular-cellular, physical-chemical level
- ◆ Descriptive approaches are much less likely to succeed
- ◆ Develop hypotheses that are clearly linked to fundamental mechanisms, if possible

Scope of the Research

- ◆ Establish a broad rationale for your approach:
- ◆ Why is this research important to do in general, and why is it worth doing now?
- ◆ Are there new ideas, new techniques, new analyses available ?
- ◆ Make your aims manageable in size, but ambitious enough to be challenging --
- ◆ Let the reviewer understand the grand scheme, but be clear about the work you'll accomplish during the funding period

Specific Aims

- ◆ General Aims: provide broad rationale and motivation (in brief)
- ◆ Specific Aims: should be very precisely articulated, because they will dictate everything else you write
 - Corresponding hypotheses
 - Corresponding measurement and statistical models
 - The panel will want to know why you made your choices -
 - Let your aims drive the grant- background, preliminary data and methods

General Hints about Grant Preparation

- ◆ Avoid verbosity and clutter -an open looking grant is more readable
- ◆ Use figures and tables, rather than text
- ◆ Minimize appendices
- ◆ For a major grant gave preliminary data on all of your major aims if possible
- ◆ Have a draft read by a merciless colleague with NIH grant experience

Special Kinds of Grants for Engineers

- ◆ BRG:

Bioengineering Research Grant

Can be used for device development-may not need scientific hypotheses

- ◆ BRP -Bioengineering Research Program

An industrial, multi-project collaborative program

The Review Process

- ◆ Look for and request optimal review panel
- ◆ Few applications are funded on the first round
- ◆ Allow enough time to do revision
- ◆ Read between the lines
(and seek help from the program officers about the message the panel means to send)

Negotiating a Faculty Position that Includes Basic or Engineering Research

- ◆ Having funding in hand provides leverage
- ◆ Make sure that you seek an environment that nurtures your growth.
- ◆ You need people around you who understand your work and to share ideas with - you cannot be effective as a solitary investigator.
- ◆ You need a good start-up package, funded students or fellows, and summer salary (if on nine-month appointment)

Some Specifics about Clinical Trials

- ◆ Rarely should a full-fledged clinical trial be proposed as a first step
- ◆ Develop a logical program of research that builds over time
- ◆ Longitudinal natural history data (clinical database) can provide information about prevalence, variations in outcome, treatments received, sensitive outcome measures

Clinical Trials (cont.)

- ◆ Treatment: Is it currently well-specified and are active ingredients known?
 - Consider observational studies of treatment
 - Development of treatment manual
 - Quality control studies of treatment
- ◆ Outcome measures: Are appropriate ones in existence?
 - One level or several
 - Reliability/validation studies

CONCLUSIONS

- ◆ Success in research requires a prolonged period of training with gradually increasing independence
- ◆ Much of success depends on funding, which is highly competitive
- ◆ So Why Do It?



BECAUSE



- ◆ It's fascinating
- ◆ It's fun
- ◆ It's important to our field and to people with disabilities
- ◆ You can design your own career
- ◆ The “same” job is always different
- ◆ It's prestigious
- ◆ WHAT MORE DO YOU WANT?